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Spring 5-18-2023

## Educating Medical-Surgical Nurses in a Large Hospital Organization on Sepsis Bundle Elements

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**Educating Medical-Surgical Nurses in a Large Hospital Organization on Sepsis Bundle  
Elements**

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NURS 653: Internship

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May 3, 2023

## Abstract

**Problem:** According to a pre-survey collected, approximately six percent of medical-surgical nurses report expert knowledge with the “Inpatient Handoff Sepsis Bundle Checklist,” a checklist that details interventions to be taken when a patient is diagnosed with sepsis. About thirty-five percent of these nurses also report expert confidence levels in caring for sepsis patients. Therefore, there is an opportunity to provide education so that nurses may confidently and competently care for sepsis patients.

**Context:** A medical-surgical unit at Hospital A affiliated with a large, non-profit, integrated healthcare system located in the San Francisco Bay Area.

**Intervention:** Create an educational handout to increase awareness about sepsis and improve nurses’ confidence and knowledge in managing sepsis patients. The handout reflects education in these areas: sepsis definition, risk factors, and causes; differences between severe sepsis and septic shock; nursing management of septic patients; education of septic patients; and sepsis bundle checklist elements.

**Measures:** Pre- and post-educational surveys with six questions, five quantitative Likert-scale questions and one qualitative free-response question.

**Results:** The results of this educational intervention still need to be gathered due to time constraints. Future iterations of the project may utilize a post-survey to examine if the intervention will have a positive effect on nurses’ knowledge and confidence levels when caring for patients with sepsis. Strong evidence from the literature shows that sepsis training improves nurses’ perspectives, confidence, and knowledge in identifying and managing patients with sepsis, resulting in greater adherence to evidence-based care and improved patient outcomes (Edwards & Jones, 2021).

**Conclusion:** While this project has several limitations, including time constraints, sample size, and access to the unit, this educational handout can serve as a valuable tool to increase the knowledge and confidence levels of medical-surgical nurses when caring for patients with sepsis. Educating the staff nurses will facilitate the timely recognition and treatment of sepsis patients, ultimately resulting in better patient outcomes.

**Keywords:** *sepsis, education, nurse, knowledge, confidence, management, care, severe sepsis, septic shock, sepsis bundle*

## Introduction

Sepsis, defined as “life-threatening organ dysfunction due to a dysregulated host response to infection,” is recognized by the World Health Organization (WHO) as a global health priority (Thompson et al., 2019). Septic shock occurs in a portion of patients with sepsis and consists of an underlying cellular, circulatory, or metabolic abnormality associated with an increased risk of mortality. Clinical parameters used to define septic shock include persistent hypotension requiring vasopressors to maintain a mean arterial pressure of 65 mm Hg or greater and a serum lactate level greater than two mmol/L despite adequate volume resuscitation (Esposito et al., 2017).

Hospital-treated sepsis in adults is estimated to affect 270 people per 100,000 worldwide, with a mortality rate of 26%. This translates to 19.4 million cases and 5.3 million deaths globally each year, not including cases of sepsis in children or those that occur outside of a hospital (Thompson et al., 2019). One-in-three sepsis patients who require admission to critical care units do not survive 30 days. Moreover, sepsis survivors are more likely to require rehospitalization and are at an increased risk of death in the future. Nearly 50% of sepsis survivors are readmitted to the hospital at least once within a year, and one-in-six sepsis patients do not survive the first year (Van Der Poll, 2021). Sepsis also imposes a heavy financial burden. In the United States, hospital treatment for sepsis patients is estimated to cost more than \$24 billion (Paoli et al., 2018).

As a time-sensitive medical emergency, early recognition and prompt treatment of sepsis are essential for slowing its progression and improving patient outcomes. The International Surviving Sepsis Campaign (SSC), spearheaded by the Society of Critical Care Medicine (SCCM) and the European Society of Intensive Care Medicine (ESICM), has provided evidence-

based recommendations to improve the time to recognition and treatment of sepsis and septic shock. The SSC guidelines recommend that five essential elements be addressed within one hour of sepsis recognition: (1) measure the serum lactate level, (2) obtain blood cultures, (3) administer broad-spectrum antibiotics, (4) start appropriate fluid resuscitation, and (5) begin vasopressors if clinically indicated (Society of Critical Care Medicine, 2021). As a result of increased adherence to sepsis care bundle guidelines, there has been a reduced need for intensive care unit (ICU) admission, shorter hospital length of stay, and decreased mortality (Milano et al., 2018).

Nurses play a crucial role in the early recognition and management of patients with sepsis. Triage nurses in the emergency department are frequently the initial point of contact for evaluating patients with community-acquired sepsis. In the inpatient setting, medical-surgical or critical care nurses can quickly detect hospital-onset sepsis due to their frequent bedside monitoring of patient's signs and symptoms. However, knowledge levels about sepsis among nurses may vary depending on their nursing background, education, and training. When hospitals lack a standardized approach to educating nurses on recognizing and caring for patients with sepsis, it can result in delayed identification and treatment, ultimately leading to poor patient outcomes.

### **Problem Description**

The Neurological Observation Unit (NOU) at Hospital A is affiliated with a large non-profit, integrated healthcare system in the San Francisco Bay Area. Notably, this hospital has achieved advanced certification from The Joint Commission as a Comprehensive Stroke Center since 2016. The NOU treats many patients recovering from complex strokes and other

neurological disorders, such as multiple sclerosis, movement disorders, seizure disorders, and neuromuscular diseases (Kaiser Permanente, 2023).

A voluntary, anonymous sepsis self-assessment survey was distributed to nurses on the medical-surgical unit to assess their understanding of sepsis and confidence in identifying and treating patients with sepsis. Based on the survey data, 23% of nurses felt they had expert knowledge in explaining the definition, risk factors, and causes of sepsis. In addition, only 18% of nurses felt they had expert knowledge in their ability to recognize the difference between severe sepsis and septic shock. Approximately one-third of nurses surveyed (35%) felt they had expert knowledge in their ability to care for patients with sepsis. Furthermore, only 12% of nurses felt they had expert knowledge in their ability to teach sepsis, and only 5% felt they had expert knowledge regarding their familiarity with the “Inpatient Handoff Sepsis Bundle Checklist.”

These survey results indicate a gap in knowledge among medical-surgical nurses regarding sepsis management and protocols and an opportunity to provide education so that nurses feel more comfortable and confident in caring for patients with sepsis. Educating the staff nurses on this unit will facilitate the timely recognition and treatment of sepsis patients, resulting in high-quality care and better patient outcomes.

## **Literature Review**

### **PICO Question**

The PICO question for this project is, “In nurses on the medical-surgical unit at a Northern California hospital, what is the effect of additional education in the form of an informational sepsis handout on increasing nurses’ knowledge and confidence in caring for sepsis patients compared with no intervention?”

## **Search Strategy**

A comprehensive literature review was conducted utilizing various databases, including CINAHL Ultimate, PubMed, and Scopus, to examine this PICO question. Articles were searched using keywords from the project's PICO question, including sepsis, nurse, education, knowledge, and confidence. Limitations were placed on the search only to include peer-reviewed articles published by 2013. One article published in 2010 was included due to its relevance. A total of eight articles were selected and synthesized to gain an understanding of the existing research and knowledge regarding the project's topic.

## **Synthesis of Literature**

A large body of evidence suggests that nurse-initiated sepsis protocols can lead to more timely recognition of sepsis patients, thereby improving patient outcomes. The effect of a nurse-initiated emergency department sepsis protocol on the timing of initial antibiotic administration was assessed in a retrospective study by Bruce et al. (2015). The study also aimed to examine compliance with the 3-hour Surviving Sepsis Campaign targets and to identify predictors of in-hospital sepsis mortality. The charts of 195 patients admitted to two Southern California emergency departments were examined and evaluated. The results found that serum lactate measurement (83.9% versus 98.7%) and median time to initial antibiotic administration (135 minutes versus 108 minutes) improved significantly after protocol implementation. However, 25% of antibiotic administration times still exceeded the three-hour target. Respiratory failure, central nervous system dysfunction, urinary tract infection, use of vasopressors, and patient body weight were all significant predictors of in-hospital sepsis mortality.

Jones et al. (2015) conducted an observational study using a pre-post design to develop a nurse-based early sepsis recognition and response program. The study was conducted at a tertiary

teaching hospital in Houston, Texas. The results found that implementing the nurse-based early recognition and response program was associated with substantial and sustained decreases in inpatient sepsis-related mortality rates. Specifically, inpatient sepsis-associated death rates decreased from 29.7% before implementation to 21.1% after implementation.

Tromp et al. (2010) conducted a prospective before-and-after study to assess the effects of a nurse-driven care bundle sepsis protocol. The study followed 852 patients treated at an emergency department of a university hospital in the Netherlands. The results found that compliance with the Surviving Sepsis Campaign bundle elements significantly improved from 3.5% at baseline to 12.4% after the intervention. In addition, the completion of four of six bundle elements improved significantly, including measuring serum lactate, taking a chest radiograph, taking urine for urinalysis and culture, and starting antibiotics within three hours.

The following studies examine nurses' knowledge and confidence in identifying and treating patients with sepsis. First, a cross-sectional study was carried out by Storozuk et al. (2019) to evaluate the sepsis knowledge and attitudes of emergency department registered nurses. Three hundred twelve nurses across four teaching hospitals in a large Canadian city participated in this study, which involved an online survey consisting of four sections: perceived level of sepsis knowledge, multiple-choice questions, true-or-false questions, and free-response questions. The results found that participants scored 51.8% on overall sepsis knowledge. Moreover, the need for further sepsis knowledge was noted 225 times. According to the nurses, the main issues with providing sepsis-related care included heavy patient workloads and clinical implications related to patient status.

Harley et al. (2019) conducted a descriptive, qualitative study to examine and understand emergency department registered nurses' understanding of sepsis and pinpoint gaps in clinical



practices related to the ability to identify, respond, and treat sepsis within the emergency department. Fourteen nurses employed at a public tertiary teaching hospital in Australia participated in this study, which consisted of face-to-face, semi-structured interview questions. Six main themes were identified according to the interviews: appreciation of clinical urgency, appreciation of knowledge, appreciation of staff supervision, contribution of the organization, awareness of the importance of staff experience, and awareness of the need to seek advice. In addition, the nurses acknowledged that they frequently found it difficult to recognize and escalate patients with sepsis and cited organizational, professional, and clinical issues as major obstacles to delivering timely and effective sepsis care.

Chua et al. (2022) conducted a multi-site, cross-sectional study to explore registered nurses' knowledge and confidence in recognizing and managing patients with sepsis. Seven hundred nine nurses working in the inpatient units and emergency departments across three hospitals in Singapore participated in this study, which involved an online, anonymous survey comprised of four sections: demographics and workplace data, perceived confidence in identifying and treating patients with sepsis, multiple-choice questions, and free-response questions. The results found that only 52% of nurses could correctly define sepsis. Total sepsis knowledge scores ranged from 3 to 15, with a mean score of 10.56 out of 15. The range of overall self-confidence scores in identifying and treating sepsis patients was 5 to 25, with a mean score of 18.46 out of 25.

The remaining studies examine the effects of educational interventions on increasing sepsis knowledge among nurses. A longitudinal quasi-experimental study design was used by Phillips et al. (2020) to investigate the impact of education using the boost methodology on registered nurses' recall of sepsis information. The sepsis video education intervention group

received educational supplements 14 days, one month, and two months after the first video education was finished, along with pretest and posttest evaluations. The control group completed the online educational module but received no educational boosts. Three hundred ninety-six nurses employed on acute care units at a large hospital in the western United States participated in this study. The results found that both intervention and control groups significantly increased test scores during the study period. On top of that, the intervention group's mean test results were noticeably higher.

Lastly, Rechter et al. (2022) utilized an interventional study design to evaluate knowledge gain and improvement in identifying and treating sepsis among registered nurses and patient care technicians. Two thousand three hundred seventy-seven nurses and patient care technicians participated in this study, which consisted of computer-based sepsis educational modules with pretest and posttest assessments. According to the findings, 17% of nurses improved in all four modules, and 80% of nurses showed improvement in at least one post-test score. Likewise, 53% of patient care technicians demonstrated an improved post-test score percentage along with an improved average score percentage.

These eight articles strongly support implementing this quality improvement project in the Neurological Observation Unit. Nurses play an essential role in recognizing and responding to sepsis. However, the selected articles demonstrate that nurses do not have sufficient knowledge regarding sepsis nor adequate confidence in caring for sepsis patients. The information gathered from this literature review sheds light on the knowledge gap among nurses regarding sepsis care and management and helps guide the educational intervention for this project. The staff educational plan will focus on identifying sepsis in patients and initiating the sepsis care bundle protocols so that patients may receive treatment in a timely manner.

## **Rationale**

Kurt Lewin's Theory of Planned Change (TPC) is the change theory used to guide this quality improvement project. Lewin, a prominent social psychologist of the early 20th century, developed a three-stage change model called the unfreezing-change-refreezing model (Shirey, 2013). Understanding and utilizing Lewin's theory is essential in promoting and sustaining change within the microsystem.

The first stage, unfreezing, involves preparing for the upcoming change. Key steps include conducting a microsystem assessment to determine the current state, describing the problem area, presenting evidence-based research on why the change is necessary, and identifying key stakeholders to drive and support the change project (Shirey, 2013). In this project, the needed change is increasing nurse knowledge and confidence in caring for septic patients to reduce patient mortality. Through self-assessment surveys, the students identified the staff's gap in knowledge regarding the care of sepsis patients and began conducting a thorough, evidence-based literature review to guide the quality improvement project.

Change, the second stage of Lewin's theory, involves implementing the desired change. The change phase is most successful when transparent communication and staff engagement is at the forefront (Shirey, 2013). The students addressed the nurses' knowledge gaps for this project by developing an educational plan incorporating sepsis recognition, management, and patient education elements. After presenting their educational plan at an all-staff meeting, the students will ask for feedback from the nurses to refine this quality improvement for future use.

The last stage of Lewin's theory, refreezing, involves embedding the change into existing standards of practice (Shirey, 2013). In this stage, it is crucial to offer ongoing support to nurses, whether that is through additional education, training, or resources. This quality improvement

project addresses refreezing by providing a copy of the educational handout that can be shown to new graduate nurses, experienced new hires, or staff nurses who need a refresher on sepsis care and management. Once the change is fully integrated into the microsystem, an evaluation should be performed to reflect upon the process, document challenges encountered, and celebrate a new achievement.

### **Project Aim**

This quality improvement project aims to increase the knowledge and confidence levels of nurses regarding sepsis care and management in the Neurological Observation Unit by 25%. The project will include an educational handout and training for the staff nurses based on their learning needs to improve their knowledge of sepsis and confidence in caring for patients with sepsis.

### **Context**

Various assessment tools were used to develop this quality improvement project, including a microsystem assessment, SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis, and cost-benefit analysis.

A microsystem assessment utilizing the 5P framework was conducted on the Neurological Observation Unit to understand better how the unit operates, what educational resources are currently available to nurses, and what barriers exist to increasing nurse education regarding sepsis. The five assessed areas include patients, purpose, processes, professionals, and patterns. A thorough review of the unit found that the two areas in which the microsystem could be improved are processes and patterns. Staff surveys emphasize a lack of knowledge in the ability to recognize sepsis and care for sepsis patients. Furthermore, over 95% of nurses were unfamiliar with the “Inpatient Handoff Sepsis Bundle Checklist,” which outlines the key steps to

be taken when a patient is diagnosed with sepsis. Although this checklist is located within the unit's sepsis binder, there is no standardized approach to educating nurses on the early signs and symptoms of sepsis, which plays a crucial role in the ability of nurses to recognize septic patients and initiate the bundle elements in a timely manner.

Additionally, a SWOT analysis was utilized to examine the strengths, weaknesses, opportunities, and threats associated with implementing this quality improvement project. The major strengths of this project are that it is relatively low-cost and short in duration, with the staff training being only ten minutes long. The educational handout can also be quickly disseminated to nurses throughout the unit, either in a digital or physical copy and placed throughout the unit in high-traffic areas, such as break rooms and bulletin boards, to serve as a quick refresher on sepsis care guidelines. The project presents several opportunities to improve nurse knowledge and confidence in managing septic patients and improve patient and unit outcomes, including sepsis-related mortality rates and compliance with sepsis bundle elements. Several weaknesses were identified when conducting the SWOT analysis, including a limited timeline to develop and implement the project and a lack of unit champions to raise awareness about the project and encourage staff participation. Significant threats to the project include a potential unwillingness of nurses to participate in the staff education, either due to lack of time or uninterest, and nurses not truthfully rating their knowledge and confidence levels on the pre- and post-surveys, leading to inaccurate results.

Lastly, a cost-benefit analysis was conducted to evaluate the expenses that the quality improvement project might incur. As part of their internship course, the students developed and implemented the educational materials and training, saving the hospital the expense of hiring nursing staff to conduct these sessions. Furthermore, the educational handout was created and

shared digitally, so no additional costs were associated with developing and disseminating the training materials. In the future, if the unit were to decide to physically print out the educational handout to distribute to nurses or post around the unit, the cost of paper and ink would be minimal and already incorporated into the unit's overall budget. Overall, the students' goals were to keep this project low-cost in order for it to be successfully implemented into the unit's standardized sepsis education for nurses.

### **Intervention**

The quality improvement project was implemented over 15 weeks from February 2023 to May 2023. The intervention began with a self-assessment pre-survey to assess existing nurse knowledge and confidence in identifying and managing patients with sepsis. The survey was distributed to the nurses on the Neurological Observation Unit in person, and participation was voluntary and anonymous. The pre-survey consisted of five quantitative Likert-scale questions and one qualitative free-response question involving a case scenario. After reviewing the data, the students created an educational plan to address the learning needs identified in the pre-survey effectively.

An educational handout was created to reflect education in these areas: how to recognize sepsis; the difference between severe sepsis and septic shock; risk factors associated with sepsis; and the three-hour and six-hour sepsis bundle elements. The students presented this handout at a monthly staff meeting to approximately 35 staff nurses and the nurse manager. The education lasted ten minutes, with time allotted at the end for follow-up questions and feedback. Additionally, the students provided the nurse manager with a copy of the educational handout so that it may be shown to future new hires or staff nurses who want a refresher on sepsis education. Unfortunately, due to time constraints, a post-survey could not be sent out within the 15-week

time frame of the project. However, future iterations of this quality improvement project may send out a post-survey with the same six Likert-scale and free-response questions.

### **Measures**

The measures for this project were collected in the self-assessment pre-survey created by Dr. Theresa Mostasisa (Mostasisa, 2023). Future studies would also look at the self-assessment post-survey. The survey had six questions to collect both quantitative and qualitative data. The five Likert-scale questions were graded on a scale of 1 to 5, with one indicating “do not have any knowledge” and five representing “have expert knowledge.” The five questions evaluated were for the following statements: “I can explain sepsis (definition, risk factors, and cause),” “I can recognize the difference between severe sepsis and septic shock,” “I feel comfortable in caring for a sepsis patient,” “I can teach sepsis,” and “I am familiar with the ‘Inpatient Handoff Sepsis Bundle Checklist.’” The sixth question described a case scenario involving a newly admitted sepsis patient and inquired about the respondent’s nursing actions. The post-survey will include the same five Likert-scale questions along with free-response questions regarding project modifications and suggestions for future research. This information can help guide future phases of this staff education project.

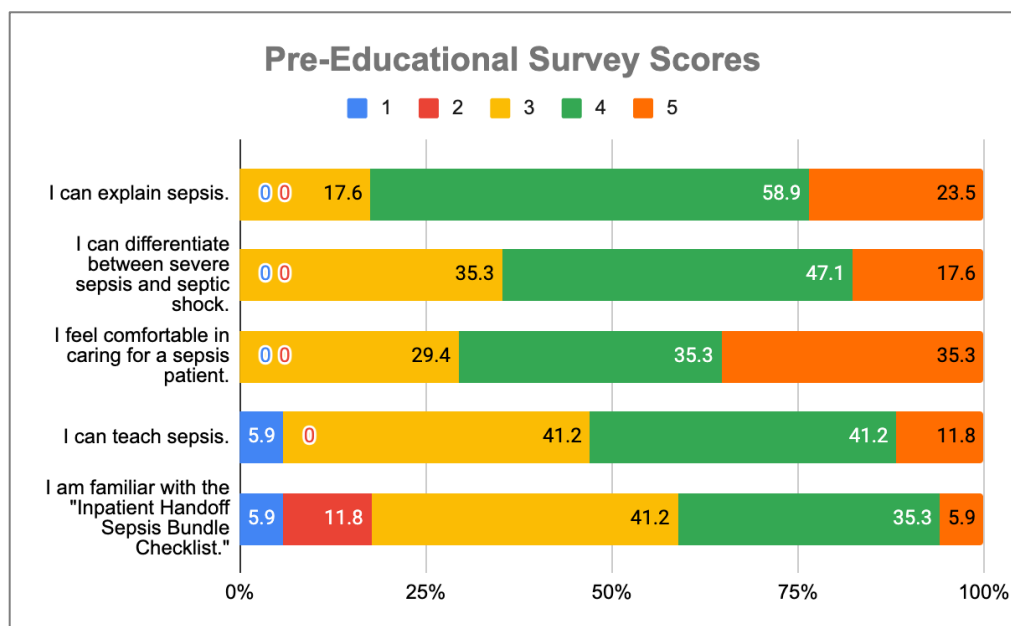
### **Results**

A pre-survey consisting of Likert-scale and free-response questions were distributed to staff nurses before an educational presentation on the care and management of septic patients (Mostasisa, 2023). Due to time constraints, a post-survey could not be distributed within the provided timeframe. The pre-surveys measured the nurses’ existing confidence and knowledge in recognizing and caring for patients with sepsis.

Seventeen nurses responded to the pre-educational survey. In regards to the first question, “I can explain sepsis,” 17.6% of nurses rated their knowledge level a three out of five, 58.9% of nurses rated their knowledge level a four out of five, and 23.5% of nurses rated their knowledge level a five out of five. In regards to the second question, “I can recognize the difference between severe sepsis and septic shock,” 35.3% of nurses rated their knowledge level a three out of five, 47.1% of nurses rated their knowledge level a four out of five, and 17.6% of nurses rated their knowledge level a five out of five. In regards to the third question, “I feel comfortable in caring for a sepsis patient,” 29.4% of nurses rated their confidence level a three out of five, 35.3% of nurses rated their confidence level a four out of five, and 35.3% of nurses rated their confidence level a five out of five.

In regards to the fourth question, “I can teach sepsis,” 5.9% of nurses rated their confidence level a one out of five, 41.2% of nurses rated their confidence level a three out of five, 41.2% of nurses rated their confidence level a four out of five, and 11.8% of nurses rated their confidence level a five out of five. Lastly, in regards to the fifth question, “I am familiar with the inpatient sepsis bundle checklist,” 5.9% of nurses rated their knowledge level a one out of five, 11.8% of nurses rated their knowledge level a two out of five, 41.2% of nurses rated their knowledge level a three out of five, 35.3% of nurses rated their knowledge level a four out of five, and 5.9% of nurses rated their knowledge level a five out of five. The results of the pre-survey are shown in Figure 1.



**Figure 1**

### Discussion

This quality improvement project aimed to increase nurses' knowledge and confidence in recognizing and managing patients with sepsis. The pre-educational survey findings suggest a knowledge gap among staff nurses regarding sepsis care and management and an opportunity to provide education so that patients may receive timely and efficient care. The students addressed this knowledge gap by creating an educational handout that reflects education in these areas: sepsis definition, risk factors, and causes; differences between severe sepsis and septic shock; nursing management of septic patients; education of septic patients; and sepsis bundle checklist elements. This educational handout was presented to the nurses at an all-staff meeting and distributed to the nurse manager for further circulation. As nurses often have many competing priorities throughout their work day, the students wanted to provide them with a simplified, easy-to-read handout that details important sepsis assessments and interventions. By making this information accessible and convenient, we hope that it will improve nurses' knowledge and confidence in caring for patients with sepsis.

Due to time constraints, the results of this educational intervention still need to be gathered. However, the literature shows that sepsis training improves nurses' attitudes, confidence, and knowledge in identifying and treating patients with sepsis, resulting in greater adherence to evidence-based care and improved patient outcomes (Edwards & Jones, 2021). Therefore, the students hypothesize that the post-survey results will demonstrate that the educational intervention will increase medical-surgical nurses' knowledge and confidence levels when caring for septic patients.

This quality improvement project had several limitations. First, due to time constraints, the students could not send out the post-surveys and gather results in a timely manner. Ideally, there would be an interval of approximately one to two weeks after the educational intervention to collect responses from the staff nurses. In addition, due to scheduling issues, the students had limited time and access to the unit, making it challenging to engage with the staff and identify unit champions to help raise awareness about the project. This may have contributed to the low pre-survey response rate of seventeen nurses. The students also acknowledge that the nurses may be too busy to complete a survey due to competing priorities during their work day.

After some discussion and reflection, the students have a few recommendations for future phases of this project. First, the educational intervention should occur one-on-one or in small groups so nurses may feel more comfortable asking questions or raising concerns. While presenting the education at a large staff meeting does reach a larger audience, it may also feel too impersonalized or unengaging. In addition, the pre-survey should contain some questions regarding demographics, such as years of nursing experience, education level, and additional sepsis training outside of work requirements. These questions can help provide a basis for

understanding the baseline knowledge and confidence level of nurses on the medical-surgical unit.

An ideal project timeline would be as follows: (1) allow one-two weeks for nurses to complete the pre-survey; (2) implement the educational plan over two-three weeks with nurses on the unit, either individually or in small groups; (3) allow one-two weeks for nurses to complete the post-survey.

### **Conclusion**

Identifying and treating patients with sepsis is both challenging and multifaceted. An educational handout that provides nursing staff with key definitions, assessments, and interventions may be a valuable tool to increase the knowledge and confidence level of medical-surgical nurses when caring for patients with sepsis. Additional staff participation and an extended project timeline are necessary to gather results and see if the implementation will exhibit the desired effects. Due to the heavy financial burden sepsis imposes on hospital systems, future research could look into the fiscal impacts of this intervention. Lastly, efforts should be focused on continuous education so that nursing staff are up-to-date on the latest evidence-based sepsis care practices. This will facilitate the timely identification and treatment of sepsis patients, ultimately resulting in improved outcomes both within and outside the hospital.

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## Appendix A

Literature Synthesis Table						
Author(s)	Objective	Design	Sample & Setting	Results	Conclusion	Implications for Practice
Storozuk, S.A., MacLeod, M., Freeman, S., & Banner, D. (2019). A survey of sepsis knowledge among Canadian emergency department registered nurses.	To assess emergency department registered nurses' knowledge of sepsis and their perspectives of caring for patients with sepsis.	An online cross-sectional survey consisting of four sections: (1) demographics and perceived level of sepsis knowledge; (2) multiple response questions; (3) true-or-false questions; (4) free response questions.	312 emergency department registered nurses employed at four teaching hospitals in a large western Canadian city.	Participants scored an average of 51.8% on overall knowledge of sepsis. The need for further sepsis knowledge was cited 225 times. Main themes of challenges in providing sepsis-related care included heavy patient workloads and clinical implications related to patient status.	Significant gaps in nurses' knowledge of sepsis was evident. Nurses acknowledged the need to further their knowledge and provided suggestions on how to do so. Nurses also identified that caring for patients with sepsis is challenging, both clinically and technically, and noted several structural barriers in providing sufficient and timely sepsis care.	Further educational opportunities, such as through handouts, simulations, and patient case studies, can help support nurses with regards to early recognition and rapid intervention for patients with sepsis.
Harley, A., Johnston, A.N.B., Denny, K.J., Keijzers, G., Crilly, J., & Massey, D. (2019). Emergency nurses' knowledge and understanding of their role in recognizing and responding to patients with sepsis: A	To explore and understand emergency department nurses' knowledge of sepsis and identify gaps in clinical practices surrounding the ability to recognize, respond, and manage sepsis within the	A descriptive, qualitative design incorporating face-to-face semi-structured interview questions regarding nurses' experiences and perceptions of recognizing and responding to patients with sepsis.	14 emergency department registered nurses employed at a 750-bed public tertiary teaching hospital in Australia.	Six key themes were identified: (1) contribution of the organization; (2) appreciation of knowledge; (3) appreciation of clinical urgency; (4) appreciation of the importance of staff supervision; (5) awareness of the importance of staff experience; (6) awareness of the need to seek advice.	Nurses identified that they often struggled to recognize and escalate patients with sepsis and noted organizational, professional, and clinical factors as significant barriers to providing timely and appropriate sepsis care.	The knowledge and insights gained from this study can be used to influence local and international emergency department policies regarding sepsis recognition, escalation, and management, and support nursing educational approaches that aim to improve

qualitative study.	emergency department.					the quality of patient care and patient outcomes.
Chua, W.L., Teh, C.S., Basri, M., Ong, S.T., Phang, N., & Goh, E.L. (2022). Nurses' knowledge and confidence in recognizing and managing patients with sepsis: A multi-site cross-sectional study.	To examine registered nurses' knowledge and confidence in recognizing and managing patients with sepsis and to identify nurse and workplace factors that influence their knowledge on sepsis.	A multi-site, cross-sectional design using an anonymous online survey comprised of four sections: (1) demographic and workplace data; (2) perceived confidence in recognizing and managing patients with sepsis, rated on a 5-point Likert scale; (3) multiple-choice questions regarding sepsis knowledge; (4) open-ended and free-response question.	709 nurses working in the inpatient wards and emergency departments of three hospitals of a public healthcare cluster in western Singapore.	Only 52% of nurses could correctly define sepsis. Total sepsis knowledge scores ranged from 3 to 15, with a mean score of 10.56 out of 15. Total self-confidence scores in recognizing and managing patients with sepsis ranged from 5 to 25, with a mean score of 18.46 out of 25. Nurses' job grade, education level, and clinical work area were found to be significant predictors of nurses' sepsis knowledge.	A stronger foundation in sepsis education and training programs and the implementation of sepsis screening tools and care bundles are needed to increase nurses' knowledge and confidence in recognizing and managing patients with sepsis.	The findings of this study are beneficial to administrators, educators, and researchers in designing and implementing interventions to support nurses in their role in recognizing and responding to sepsis, including developing nurse-driven sepsis screening algorithms and sepsis care protocols and expanding workplace-based sepsis educational programs.
Bruce, H.R., Maiden, J., Fedullo, P.F., & Kim, S.C. (2015). Impact of nurse-initiated ED sepsis protocol on compliance with sepsis bundles, time to initial antibiotic administration, and in-hospital mortality.	To evaluate the impact of a nurse-initiated emergency department sepsis protocol on time to initial antibiotic administration, to ascertain compliance with 3-hour Surviving Sepsis Campaign targets, and to identify predictors of in-hospital sepsis mortality.	A retrospective chart review of patients admitted to the hospital through either of two emergency department research sites.	195 patients admitted to two Southern California emergency departments, both associated with a single academic tertiary medical center.	Serum lactate measurement (83.9% vs 98.7%) and median time to initial antibiotic administration (135 minutes vs 108 minutes) improved significantly after protocol implementation. 25% of antibiotic administration times still exceeded the 3-hour target. Significant predictors of in-hospital mortality included respiratory	Implementation of a nurse-driven emergency department sepsis protocol significantly shortened the median time to antibiotic administration and improved the rate of serum lactate measurement. Protocol implementation found no significant change in the in-hospital mortality rate. Compliance with the	Sepsis bundle elements requiring multidisciplinary coordination (e.g. antibiotic and fluid administration) will need to be improved upon in order to reach the 3-hour Surviving Sepsis Campaign targets. Because patients with respiratory or central nervous system dysfunction have a significantly higher in-hospital mortality rate, it



				dysfunction, central nervous system dysfunction, urinary tract infection, vasopressor administration, and patient body weight.	Surviving Sepsis Campaign targets will require a multidisciplinary team effort.	is important to ensure that these patients are recognized quickly and receive timely interventions.
Jones, S.L., Ashton, C.M., Kiehne, L., Gigliotti, E., Bell-Gordon, C., Disbot, M., Masud, F., Shirkey, B.A., & Wray, N.P. (2015). Reductions in sepsis mortality and costs after design and implementation of a nurse-based early recognition and response program.	To develop a nurse-based sepsis early recognition and response program comprised of four key elements, including leadership, technology, evidence-based clinical protocols, and workforce education.	An observational study using a before-after (pre-post) design with four components: (1) leadership; (2) development of the early sepsis/SIRS screening tool; (3) screening and response protocols; (4) education and training of nurses.	A tertiary referral and teaching hospital located in Houston.	By year three, 33% of inpatient stays were screened, up from 10% in year one. Inpatient sepsis-associated death rates decreased from 29.7% before implementation to 21.1% after implementation. Death rates and hospital costs for Medicare beneficiaries decreased from pre-implementation levels without a compensatory increase in discharges to post-acute care.	Implementation of the nurse-based early recognition and response program was associated with substantial and sustained decreases in inpatient sepsis-related death rates. Moreover, these lower death rates were associated with lower costs of inpatient care.	Further testing must be done in order for the program to be implemented in other hospitals and medical centers.
Tromp, M., Hulscher, M., Bleeker-Rovers, C.P., Peters, L., van den Berg, D., Borm, G.F., Kullberg, B.J., van Achterberg, T., & Pickkers, P. (2010). The role of nurses in the recognition and treatment of patients with sepsis in the	To determine the effects of a multifaceted implementation program including the introduction of a nurse-driven, care bundle based sepsis protocol followed by training and performance feedback.	A prospective before-and-after study in which two consecutive interventions were carried out: (1) the use of a nurse-driven, care bundle based sepsis protocol and (2) training and feedback regarding the sepsis protocol.	852 patients treated at an emergency department of a university hospital in the Netherlands.	Compliance with the complete Surviving Sepsis Campaign bundle elements significantly improved from 3.5% at baseline to 12.4% after the intervention. The completion of four of six bundle elements improved significantly, including measure	After the implementation of a primarily nurse-driven, care bundle based sepsis protocol followed by training and performance feedback, early recognition of sepsis in patients presenting to the emergency department and	More attention should be given to the role of nurses in quality improvement of sepsis care.

emergency department: A prospective before-and-after intervention study.				serum lactate; take a chest radiograph; take urine for urinalysis and culture; and start antibiotics within three hours.	compliance with the Surviving Sepsis Campaign recommendations significantly improved.	
Phillips, J.M., Miller, P.S., Feldman, K., & Galuska, L. (2020). The impact of boost methodology on nurse knowledge retention.	To examine the long-term effect of education delivered using boost methodology on sepsis knowledge retention among registered nurses in an acute care setting.	A longitudinal, quasi-experimental study design consisting of an intervention group (online sepsis video education module with pretest and posttest knowledge assessments followed by educational boosts at 14 days, one month, and two months post-initial video education) and a control group (online sepsis video education module without educational boosts).	396 registered nurses employed at six acute care units (emergency department, medical-surgical, critical care) of a large academic health system in a metropolitan area of the western United States.	Both intervention and control groups had a significant increase in test scores during the study period. At most time points, mean test scores were significantly higher in the intervention group.	These findings suggest that using boost methodology to reinforce educational content increased sepsis knowledge retention among nurses while also increasing sepsis bundle compliance and decreasing septic shock mortality rate.	Utilizing the boost methodology may eliminate the need to formally reeducate staff, thus decreasing the financial burden of traditional educational programs.
Rechter, J.L., Buckholz, R.M., Plant, E.R., Klein, J.P., & Powers, J. (2022). Interactive sepsis education program improves nurses' knowledge and impact on patient outcomes.	To evaluate knowledge gain and improved proficiency in identification and treatment of sepsis among registered nurses and patient care technicians through completion of a	An interventional study design comparing pre- and post-test assessment scores for four modules in an online learning platform called "Sepsis 2.0 – A Systemic Response."	2,377 registered nurses and patient care technicians employed at a multi-facility healthcare system in the midwestern United States.	80% of nurses demonstrated an improved post-test score in at least one module, and 17% demonstrated improvement in all four modules. 53% of patient care technicians demonstrated an improved post-test score percentage and an average score percentage.	After the implementation of the online learning program, most nurses and patient care technicians improved their post-test assessment scores to reach a competency of at least 80% or higher. An	Since proper identification and adequate treatment of sepsis requires an interdisciplinary team effort, future research should include all disciplines within a healthcare system, such as physicians and pharmacists. The current

	didactic computer-based sepsis program.				anonymous survey also found that participants found this computer-based program valuable.	computer-based program can be used when onboarding new graduate nurses or newly hired staff or when providing ongoing learning for current staff.
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## Appendix B

### SWOT Analysis

<b>Strengths</b>	<b>Weaknesses</b>
<ul style="list-style-type: none"> <li>• Relatively low cost</li> <li>• Short training duration</li> <li>• Handout easily disseminated to nurses (e.g. during shift huddle, placed in sepsis binder)</li> </ul>	<ul style="list-style-type: none"> <li>• Limited timeline to develop and implement project</li> <li>• Lack of unit champions to raise awareness about project and encourage staff participation</li> </ul>
<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"> <li>• Improves nurse confidence and knowledge in managing septic patients</li> <li>• Improves outcomes on medical surgical unit, including sepsis-related mortality rates and compliance with sepsis bundle elements</li> </ul>	<ul style="list-style-type: none"> <li>• Unwillingness of nurses to participate in project</li> <li>• Nurses not truthfully rating their knowledge and confidence levels on the pre- and post-survey</li> </ul>



## Appendix D

### Pre-Educational Survey

#### RN SEPSIS SELF-ASSESSMENT SURVEY

**Date:** \_\_\_\_\_

**Department:** \_\_\_\_\_

**Purpose:** This volunteer/anonymous RN SEPSIS SELF-ASSESSMENT SURVEY will provide qualitative/quantitative data to capture existing RN SEPSIS KNOWLEDGE and CONFIDENCE in recognizing and managing patients with sepsis.

**Instructions:** Please answer questions #1 through #5 using the Likert Scale (0 =do not have any knowledge to 5= have expert knowledge). For question #5, please write in your answer.

#1. I can explain Sepsis (definition, risk factors, and cause).

0    1    2    3    4    5

#2. I can recognize the difference between Severe Sepsis and Septic Shock.

0    1    2    3    4    5

#3. I feel comfortable in caring for a Sepsis patient.

0    1    2    3    4    5

#4. I can teach Sepsis.

0    1    2    3    4    5

#5. I am familiar with the "Inpatient Handoff Sepsis Bundle Checklist".

0    1    2    3    4    5

#5. Case Scenario: Mr. Charles Brown was admitted to your unit at 1200 noon (came from the ED). TZ (Time Zero) was established at 0700 in ED. Initial Lactic Acid result 2.0 at 0800. Currently infusing is IV LR at 125 ml/hr. What are your nursing actions?

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**Thank you for your participation!**

## Appendix E

### Educational Handout



#### Sepsis Definitions

**Sepsis** is a dysregulated host response to infection, most often originating in the lung, urinary, skin, or GI tract [1]

**Severe sepsis** occurs when one or more organs are damaged, causing symptoms such as little to no urine output, difficulty breathing, and an abnormal heartbeat [3]

**Septic shock** is when blood pressure drops in addition to organ damage [3]

#### Sepsis Bundle Elements\*<sup>[2]</sup>

##### 3-Hour Bundle:

- Complete target fluid bolus (actual or ideal weight based)
- Use NICOM (non-invasive cardiac output monitor) if indicated

##### 6-Hour Bundle:

- Repeat lactate if initial lactate > 1.9
- Check BP/MAP twice 1-hour post fluids
- Provider notified for persistent hypotension (if SBP < 100 or MAP > 65)
- Vasopressor ordered/given (ED/ICU only)

\*subject to change in facility protocol

#### Risk Factors<sup>[1]</sup>



Recognize the symptoms of severe infection and sepsis, TIME is important [3]



**T:** temperature (higher or lower than normal)

**I:** infection (may have s/s of infection)

**M:** mental decline (confused, sleepy, difficult to rouse)

**E:** extremely ill (severe pain, discomfort, SOB)

#### REFERENCES

- [1] Centers for Disease Control, <https://www.cdc.gov/sepsis/index.html>
- [2] Kaiser Permanente "Inpatient Handoff Sepsis Bundle Checklist"
- [3] Sepsis Alliance - <https://www.sepsis.org/sepsis-basics/what-is-sepsis/>

#### WANT TO LEARN MORE?

Sepsis Alliance has a free course for nurses to learn about sepsis!  
2.30 RN CE contact hours, scan the QR Code:

